

# PATENT SPECIFICATION

NO DRAWINGS

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The Inventors of this invention in the sense of being the devisers thereof within the meaning of Section 16 of the Patents Act, 1949 are:—  
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## COMPLETE SPECIFICATION

### Self-extinguishing Bonded Non-woven Fabrics

- We, BADISCHE ANILIN- & SODA FABRIK AKTIENGESELLSCHAFT, a German Joint Stock Company of Ludwigshafen/Rhein, Federal Republic of Germany, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following Statement:—
- 10 This invention relates to self-extinguishing bonded non-woven fabrics.
- The production of bonded non-woven fabrics is known. In some of the prior art methods, non-woven fabrics are bonded by means of dispersions of film-forming plastics. Polymers based on acrylic esters and/or butadiene polymers are particularly suitable as film-forming plastics.
- It is desirable in many cases to obtain self-extinguishing bonded non-woven fabrics. We have now found that bonded non-woven fabrics are self-extinguishing when they contain as a binding agent from 20 to 200% by weight of polymers based on acrylic esters and/or butadiene, from 15 to 150% by weight of copolymers containing at least 80% by weight of vinylidene chloride units; and finally from 15 to 150% by weight of antimony trioxide, the percentages (with the exception of the percentage of vinylidene chloride units) being with reference to the weight of fibres.
- The non-woven fabrics may be made from natural or synthetic fibres. Examples of non-woven fabrics which may be treated according to the present invention are those of wool, cotton, rayon staple fibre, and those made of fibres of polyesters, polyamides or polyacrylonitrile or mixtures of these fibres. Non-woven fabrics made of glass wool or mineral wool may also be treated according to this invention.
- Polymers based on acrylic esters and/or butadiene may be used as binders. Examples of suitable polymers of this type are those of butyl acrylate or ethylhexyl acrylate and particularly copolymers of these acrylic esters with other monomeric compounds, such as vinyl esters, styrene, butadiene, vinyl chloride and vinylidene chloride. The binders based on butadiene may be particularly copolymers of butadiene with acrylonitrile or styrene.
- The polymers used as binders may contain reactive groups which have a crosslinking effect under the influence of heat and/or catalysts.
- Besides these polymers and copolymers which are already known for finishing bonded non-woven fabrics, copolymers of vinylidene chloride which contain at least 80% by weight of vinylidene chloride units are coemployed according to this invention. Copolymers which contain 80 to 96% by weight of vinylidene chloride units and corresponding amounts of acrylic ester, acrylonitrile, vinyl ester, or vinyl chloride units are particularly suitable copolymers of the said type.
- Binders based on acrylic acid esters and/or butadiene polymers are used in amounts of from 20 to 200% by weight, preferably from 80 to 150% by weight, with reference to the weight of the fibres of the bonded non-woven fabric. They are generally added in the form of aqueous dispersions to the non-woven

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fabrics. The amount of vinylidene chloride copolymer which is used may be from about 15 to about 150% by weight, preferably from 60 to 130% by weight, with reference to the weight of fibres of the bonded non-woven fabric. The vinylidene chloride polymers are generally also used in the form of aqueous dispersions in the binder mixture.

It is however particularly advantageous to add the copolymer of vinylidene chloride in powdered form to the aqueous dispersion of the acrylic ester or butadiene polymer and to bond the non-woven fabric with this mixture.

Antimony trioxide is advantageously used in finely powdered form in amounts from 15 to 150% by weight, preferably from 50 to 100% by weight, with reference to the weight of the fibres of the non-woven fabric before it has been bonded.

The combination of polymers or copolymers of acrylic esters and/or butadiene acting as binders with copolymers of vinylidene chloride and with antimony trioxide is responsible for the self-extinguishing property of the non-woven fabric finished therewith. If the copolymers of vinylidene chloride are used, not as aqueous dispersions, but as powders, the elasticity of the non-woven fabrics is scarcely affected. Otherwise a stiffening of the handle may be achieved.

The amount of the mixture of binder, vinylidene chloride polymer and antimony trioxide which is required for the production of the self-extinguishing bonded non-woven fabric depends on the degree of flammability of the fibres used. Fibres based on polyamides or polyesters are bonded with twice to four times the weight and fibres of cotton or rayon staple fibre with once to twice the weight of the mixture of binder, vinylidene chloride copolymer and antimony trioxide.

Resistance to solvents, particularly those which are conventionally used in dry cleaning, such as perchloroethylene and trichloroethylene, is improved by the copolymers of vinylidene chloride.

Self-extinguishing bonded non-woven fabrics may be used for example as furnishing fabrics or upholstery fabrics.

The invention will be further illustrated by the following Examples. The parts specified in the Examples are parts by weight and the percentages are percentages by weight.

#### EXAMPLE 1

A cross-laid carded fleece of rayon staple fibre having a weight of about 50 g/sq.m. is impregnated with a mixture of 65 parts of a 40% aqueous dispersion of a copolymer of 95% of n-butyl acrylate and 5% of methylol-methacrylamide, 35 parts of a 55% aqueous dispersion of a copolymer of 80% of vinylidene chloride and 20% of n-butyl

acrylate, 10 parts of a 10% aqueous solution of a copolymer of 65% of vinylpyrrolidone and 35% of vinyl acetate which serves as a thickening agent, 25 parts of antimony trioxide and 25 parts of water. The impregnated non-woven fabric is then squeezed out and dried for three minutes at 110°C and for another three minutes at 150°C. The dried non-woven fabric contains about 190% of the binder mixture with reference to the raw fleece.

The non-woven fabric is tested for self-extinction in a conventional manner. The non-woven fabric ceases to burn immediately after it has been removed from the primary flame.

#### EXAMPLE 2

A carded fleece of polyester fibres having a weight of about 50 g/sq.m. is impregnated as described in Example 1 with a mixture of 65 parts of a 40% dispersion of a copolymer of 95% of n-butyl acrylate and 5% of methylolmethacrylamide, 35 parts of a 50% aqueous dispersion of a copolymer of 91% of vinylidene chloride and 9% of methyl acrylate, 10 parts of a 10% aqueous solution of a copolymer of 65% of vinylpyrrolidone and 35% of vinyl acetate which serves as a thickening agent, 25 parts of antimony trioxide and 30 parts of water squeezed out and dried.

The dried non-woven fabric contains about 300% of the binder mixture with reference to the raw fleece. In a test as described in Example 1, the non-woven fabric ceases to burn within two seconds after it has been removed from the primary flame.

#### EXAMPLE 3

A carded fleece of polycaprolactam fibres having a weight of about 50 g/sq.m. is impregnated as described in Example 1 with a mixture of 100 parts of a 40% aqueous dispersion of a copolymer of 95% of n-butyl acrylate and 5% of methylolmethacrylamide, 10 parts of a 10% solution of a copolymer of 65% of vinylpyrrolidone and 35% of vinyl acetate which serves as a thickening agent, 30 parts of a powdered copolymer of 90% of vinylidene chloride and 10% of acrylonitrile, 25 parts of antimony trioxide and 30 parts of water, squeezed out and dried. The dried non-woven fabric is dried for three minutes at 110°C and aftertreated for another three minutes at 150°C.

The dried non-woven fabric contains about 300% of the binder mixture with reference to the raw fleece. In the test described in Example 1, the non-woven fabric ceases to burn within one to two seconds after it has been removed from the primary flame.

#### EXAMPLE 4

A carded fleece of polyester fibres having a weight of about 50 g/sq.m. is impregnated

- as described in Example 1 with a mixture of 80 parts of a 50% aqueous dispersion of a copolymer of 60% of butadiene and 40% of styrene, 5 parts of a 10% aqueous solution of a copolymer of 65% vinylpyrrolidone and 35% of vinyl acetate which serves as a thickening agent, 30 parts of a powdered copolymer of 90% of vinylidene chloride and 10% of acrylonitrile, 20 parts of antimony trioxide, 1.7 parts of a conventional vulcanisation paste and 50 parts of water, squeezed out and dried at 120°C. Vulcanisation is then carried out for three minutes at 150°C.
- The dried non-woven fabric contains about 430% of the binder mixture, with reference to the raw fleece. In a test in accordance with Example 1, the non-woven fabric ceases to burn immediately after it has been removed from the flame.
- British patent specification No. 876,901 describes and claims a method of producing flame-proof sheet fabrics, which method comprises impregnating loose, unwoven fibre webs in a single operation with an impregnating liquid comprising a bonding agent and a flame-proofing agent and subsequently heating the impregnated fibre webs, wherein the impregnating liquid comprises one part by weight of a bonding agent comprising one or more substances consisting of synthetic rubber, natural rubber or polyacrylic resin together with from 1 to 3 parts by weight of a flame-proofing agent compatible therewith.
- WHAT WE CLAIM IS:—**
1. A self-extinguishing bonded non-woven fabric made from a fleece of fibres and a binder based on polymers, which contains:—
    - from 20 to 200% by weight of one or more polymers based on acrylic esters and/or butadiene;
    - from 15 to 150% by weight of one or more copolymers containing at least 80% by weight of vinylidene chloride units, and
    - 15 to 150% by weight of antimony trioxide,
  - the percentages (with the exception of the percentage of vinylidene chloride units) being with reference to the fibres.
  2. A self-extinguishing bonded non-woven fabric as claimed in claim 1 wherein the copolymer contains 80 to 96% by weight of vinylidene chloride units and corresponding amounts of acrylic ester, acrylonitrile, vinyl ester or vinyl chloride units.
  3. A self-extinguishing bonded non-woven fabric as claimed in claim 1 or 2 wherein the amount of the polymer based on acrylic esters and/or butadiene is from 80 to 150% by weight with reference to the fibres.
  4. A self-extinguishing bonded non-woven fabric as claimed in any of claims 1 to 3 wherein the amount of vinylidene chloride copolymer is from 60 to 130% by weight with reference to the fibres.
  5. A self-extinguishing bonded non-woven fabric as claimed in any of claims 1 to 4 wherein the polymer based on acrylic esters and/or butadiene is used in the form of an aqueous dispersion.
  6. A self-extinguishing bonded non-woven fabric as claimed in any of claims 1 to 5 wherein the vinylidene chloride copolymer is used as an aqueous dispersion.
  7. A self-extinguishing bonded non-woven fabric as claimed in any of claims 1 to 5 wherein the vinylidene copolymer is used in the form of a powder.
  8. A self-extinguishing bonded non-woven fabric as claimed in any of claims 1 to 7 wherein the antimony trioxide is used in finely powdered form.
  9. Self-extinguishing bonded non-woven fabrics substantially as described in any of the foregoing Examples.

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